

Title: Development of digital systems

Lecturer: doc dr. Matej Možek, Prof. dr. Slavko Amon

Aim of the course:

To present the theoretical foundations of digital circuits and components used in electronic and computer systems. Acquire development methods and gain practical skills for designing contemporary digital systems using modern CAD tools.

Required (pre)knowledge:

–

Contents:

Logic signals and gates with technology designs and characteristics, logic functions their simplification and realization. Analysis and structure of decision circuits: encoder, decoder, multiplexer, demultiplexer, comparators, adder, arithmetic logic unit, multiplier and divider.

Programmable circuits, its elements and realization of logic functions using programmable circuits. Synchronous circuits – introduction of time dependent state variables and implementation of memory cells.

Presentation of the characteristic equations and state transition diagrams. Analysis, description and design of asynchronous and synchronous sequential circuits (counter, register, LFSR). Finite state machines, model of synchronous machine (Mealy, Moore). Memory elements read-only and read/write - static and dynamic. Transducers, Input / output devices, Interfaces, Bus (parallel and sequential data transfer). Single-cycle-processor.

Selected references:

1. *Fundamentals of digital logic with VHDL design* / Stephen Brown, Zvonko Vranesic, McGraw-Hill, 2005, ISBN 007-246085-7
2. *Logic and computer design fundamentals* / M. Morris Mano, Charles R. Kime. Upper Saddle River : Pearson Prentice Hall, 2007 ISBN 978-0-13-198926-9
3. *Digital design : principles and practices* / John F. Wakerly Upper Saddle River : Pearson/Prentice Hall, 2006 ISBN 0-13-186389-4